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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,686	12/17/2003	Xinwu Chen	02964.002543	4140

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EXAMINER

NEWMAN, MICHAEL A

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
01/31/2008	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/736,686	CHEN ET AL.	
Examiner	Art Unit		
Michael A. Newman	2624		

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 18 December 2007.

2a)  This action is FINAL.                            2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4)  Claim(s) 1-20 is/are pending in the application.  
4a) Of the above claim(s) 3,4,6,7,9,12-18 and 20 is/are withdrawn from consideration.  
5)  Claim(s) \_\_\_\_\_ is/are allowed.  
6)  Claim(s) 1,2,5,8,10,11 and 19 is/are rejected.  
7)  Claim(s) \_\_\_\_\_ is/are objected to.  
8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on 17 December 2003 is/are: a)  accepted or b)  objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892) 4)  Interview Summary (PTO-413)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948) Paper No(s)/Mail Date. \_\_\_\_.  
3)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.  
5)  Notice of Informal Patent Application  
6)  Other: \_\_\_\_.

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 18<sup>th</sup>, 2007 has been entered.

### ***Response to Amendment***

2. The amendment received on December 18<sup>th</sup>, 2007 has been entered.

3. In view of the amendment to the claims, the amendment of claims 1, 10 and 19 is acknowledged. Claims 3-4, 6-7, 9, 12-18 and 20 were previously cancelled.

### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1, 10 and 19 have been considered but are moot in view of the new ground(s) of rejection.

a. In pages 5 and 6 Remarks received on December 18<sup>th</sup>, 2007, with regards to the 35 U.S.C. 103 rejections of the independent claim 1 over Suzuki (U.S. Patent No. 5,859,921) in view of Ando (U.S. Patent No. 5,008,946), applicant's representative submits that:

(i) Neither Suzuki nor Ando teach the newly added limitation of "determining a region encompassing a candidate eye area, with the center of the region being the center of the candidate area." The examiner respectfully disagrees. Suzuki teaches performing binarization of an input image to extract characteristic feature areas of the face such as eyebrows, eyes, nares, etc., which are candidate eye areas. With respect to Fig. 7 in Suzuki teaches, in Col. 20, that upon analyzing the image for symmetrical features a pair of eye-searching areas is defined. These steps correspond to step b) in claim 1 of "getting a candidate eye area" by analyzing the image. Suzuki then teaches that the candidate area setting means performs a histogram calculation on the eye searching areas and sets up areas BER1 and BER2 as 'eye candidate band areas'. These band areas are evaluated separately and shown in Fig. 8; specifically, note that the histogram analysis creates an eye candidate *band* that surrounds the entire candidate eye area (pupil or other) and is centered about it. Thus, this corresponds to step c) in claim 1 of "determining a region based on the candidate eye area, said region being a region *encompassing* the candidate eye area and the *center of said region being the center of the candidate eye area* (See Suzuki Col. 20 lines 1 - 49).

(ii) Ando merely sets a threshold for detecting black pixels in a whole face, and then detects the black pixels to detect a pupil. Applicant's representative insists that claim 1 recites counting dark areas in a region centered on a candidate eye area and judges a candidate eye area to be a real eye or a false eye, which

differs from "just detect[ing] a pupil" as in Ando. The examiner partially disagrees. Ando does not explicitly teach 'judging a candidate eye area to be real or false' because, as pointed out by applicant's representative, the purpose of Ando is to recursively optimize a threshold to detect pupils based on whether or not a pupil has been detected with the current threshold value, further modifying it if no pupils have been detected. However, in combination with Suzuki, Ando was used merely as a teaching of the steps of calculating the region's size, detecting and counting dark areas in the region, and comparing the ratio of the size and the number of dark regions to detect a pupil. The step of judging whether or not the candidate area is a real eye area is taught by Suzuki. In Col. 21 lines 30 - 31 teaches using the output of the eye area function (EFV) to judge whether the candidate area band (BERj) is an eye area or not. As stated in the previous office action, Suzuki's EFV method was replaced by Ando's simpler method such that the output of Ando's pupil detection would be used as the output of Suzuki's EFV method for analogous judging. Regardless, in order to advance prosecution, a new reference, Toh (U.S. Patent No. 6,257,722), has been introduced in a new 35 U.S.C. 103 rejection of the independent claims. The examiner believes the new reference will provide a better link between Suzuki and Ando.

Based on this reasonable interpretation of the claims and the prior art, the examiner respectfully insists that the rejections of claims 1, 2, 5, 8, 10, 11 and 19, set forth below are proper.

***Claim Objections***

5. Claim 10 is objected to because of the following informalities:
  - a. Lines 3 and 4 of claim 10 recite the limitations "determines a *neighborhood* region in the image..." It appears to be an editorial error given that the remainder of the claim as well as the other independent claims have been amended to omit the word "neighborhood".
6. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
8. Claims 1, 2, 5, 8, 10, 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (U.S. Patent No. 5,859,921) in view of Ando (U.S. Patent No. 5,008,946) and Toh (U.S. Patent No. 6,257,722). Hereinafter referred to as Suzuki, Ando and Toh respectively.
  - a. Regarding claims 1, 10 and 19, Suzuki teaches a human eye detection method and apparatus comprising: an input unit that inputs an image (**Suzuki Fig. 1 – element 1 and Fig. 2 – step 1**); and a processor (**Suzuki Fig. 1 element b**) that (i) analyzes the image to obtain a candidate eye area (**Suzuki Fig. 1 – elements 4 and 5**) [Note Fig. 7 and Col. 19 lines 65 – 67; the characteristic feature areas of the face are candidate eye areas]; (ii)

determines a region in the image of the candidate eye area, the region based on the candidate eye area being a region encompassing the candidate eye area and the center of said region being the center of the candidate eye area (**Suzuki Fig. 1 elements 5 and 6**) [**Note Figs. 7 and 8, and Col. 20 lines 11 – 49; in Fig. 8, the band areas are the ‘regions’ encompassing and centered about each candidate eye area**]. Suzuki goes on to teach an eye area function (EFV) to validate the candidate eye regions (**Suzuki Col. 21 lines 26 – 34**), and using the output to judge whether or not the candidate area is a real eye area. However, **Suzuki fails to teach** an eye-evaluation process which (iii) calculates the region’s size  $S$ , (iv) detects dark areas in the region and determines the total count  $N$  of dark areas in the neighborhood region, (v) and compares the ratio  $N/S$  to a predetermined first threshold, wherein if the ration  $N/S$  is smaller than the first threshold, the candidate eye area is judged to be a real eye area, else the candidate eye area is judged to be a false eye area. **Pertaining to the same field of endeavor, Ando teaches a pupil detection system in which the validity of a detected pupil is determined for the purposes of setting a variable threshold. Ando teaches (iii) obtaining the total number ‘ $S$ ’ of pixels contained in a region ‘ $S_d$ ’ (which contains the eye area) (Ando Col. 18 – lines 34 – 35), (iv) obtaining the number of black pixels ‘ $S_b$ ’ in the region ‘ $S_d$ ’, (Ando Col. 18 – lines 31 – 32), (v) comparing the ratio  $S_b/S$  to thresholds (Ando Col. 18 - line 38) and if the ratio does not lie within a range, deeming the area unsatisfactory [i.e. not correctly detected as an**

eye region]. Also pertaining to the same field of endeavor, Toh teaches a similar eyeball position detecting method to be used in an ophthalmic device. Specifically, Toh teaches counting the number of pixels having light or dark value within a predetermined range and comparing the numbers with a predetermined number of pixels. Toh also teaches judging that a pupil (or an iris surrounding the pupil) is within the evaluated area based on the comparison. To account for several areas having pixels above the predetermined threshold, a comparison is made between the area including the largest number of pixels and the surrounding areas to detect predetermined gaps in between (Toh Col. 6 lines 10 – 42). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suzuki by replacing the eye evaluation function, EFV, generating step with the valid pupil detection method taught by Ando, and to use Ando's pixel-counting detection method to judge whether or not each of Suzuki's eye candidate area bands contains a pupil or iris and therefore corresponds to a valid eye area, as suggested by Toh. Such a modification eliminating the need to evaluate the product of two auxiliary functions EFV1 and EFV2 (Suzuki Fig. 9 – step 609) and resulting in a simplified eye-region verification process consisting of the pixel-counting and thresholding.

- Regarding claim 19, Suzuki is silent as to whether the implementation of the aforementioned steps is as program code or discrete logic elements;

however, Ando teaches the implementation of the eye detection method using a microprocessor with corresponding ROM and RAM (**Ando Fig. 1 elements 8,9 and 10**) [See also Col. 7 lines 27 – 30]. Such microprocessors clearly rely on coded instructions to perform the desired operations. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to realize the steps taught by Suzuki and Ando by way of processor-executable program code in order to reduce cost and speed development by eliminating multiple discrete components as well as exploiting the flexibility of a programmable device.

b. Regarding claim 2, Suzuki in view of Ando and Toh teach all the limitations of the independent claim 1 as set forth in the 103 rejection of claim 1 above. **Suzuki also teaches** determining candidate face areas on the basis of said judged candidate eye area obtained from said step f (**Suzuki Col. 7 lines 33 – 40**).

c. Regarding claims 5 and 11, Suzuki in view of Ando and Toh teach all the limitations of the independent claims 1 and 10 and dependent claim 2 respectively as set forth in the 103 rejection of claims 1, 2 and 10 above. **Suzuki also teaches** correctly obtaining characteristic features of a face image by converting it into a binary image (**Suzuki Col. 3 lines 25 – 28**). In the pupil detection method taught by Ando used to modify Suzuki, **Ando also teaches** that the region surrounding the eye, 'S<sub>d</sub>' is also binarized using a threshold value so as to easily separate regions whose grey levels change rapidly (i.e. potential

eyes) from the background within the region (**Ando Col. 4 lines 33 – 42**).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to binarize both the entire image and the candidate eye regions by thresholding their grey scale values in order to easily differentiate dark regions (potential eye regions) from background regions while avoiding the need for additional/redundant processing steps for each.

d. Regarding claim 8, Suzuki in view of Ando and Toh teach all the limitations of the independent claim 1 and the dependent claim 2 as set forth in the 103 rejection of claims 1 and 2 above. In the pupil-detection method used to modify Suzuki, **Ando also teaches** as part of the method, a threshold or comparison value, K, calculating step prior to the ratio comparison (**Ando Col. 20 lines 59 – 63**). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a variable threshold or comparison value calculation so as to optimize the pupil detection criteria based on individual input image.

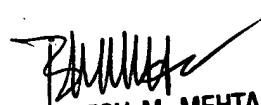
### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Newman whose telephone number is (571) 270-3016. The examiner can normally be reached on Mon - Thurs from 9:30am to 6:30pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir A. Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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